Universe Scientific Publishing

ORIGINAL ARTICLE

The Comparative Study of Open and Laparoscopic Partial Hepatectomy in 64 Cases of Patients

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ABSTRACT **Objective:** A comparative study between two methods of open and laparoscopic partial hepatectomy. **Method:** 64 cases of patients with partial hepatectomy were choosing from our hospital from January 2014 to December 2014. Two groups were assigned according to the principle of random allocation of the open group and laparoscopic group, respectively and were observed its operation index, post-operative recovery indicators and other indicators. **Results:** Abdominal incision length, intra-operative bleeding volume, post-operative advanced liquid time, and hospitalization time were significantly better in Laparoscopic than laparotomy group ($p < 0.05$). There was no significant difference in the operation time and complications between the open and laparoscopic group ($p > 0.05$). **Conclusion:** Laparoscopic partial hepatectomy is obviously superior to open liver resection where it is worth promoting in clinical practice.

KEYWORDS
Open abdomen
Laparoscopic
Hepatectomy
Comparison

1. Introduction

Liver cancer is a disease that seriously affects the survival of patients. It is an important way to treat the patients with partial hepatectomy in the present clinical treatment. Laparoscopic surgery is a minimally invasive surgical technique that has been developed in recent years and has been widely used in clinic. Compared with conventional surgery, laparoscopic surgery has the advantages of small incision, less pain and quick recovery. Because of the liver has its own special structure, it is difficult to use laparoscopic liver resection, so it is not widely used in clinic. Foreign researchers have conducted a study of laparoscopic partial hepatectomy, which has some advantages compared with the traditional surgery. Minimally invasive surgery is the trend of the current surgical operation [1]. However, due to the special structure of the liver, and there are some limitations in laparoscopic hepatectomy which has a relatively high risk of surgery, it has become an important research content of the current treatment of liver cancer. A total of 64 patients with liver resection from January to December 2014 in our hospital, were selected for the implementation of open and laparoscopic surgery. As a result, the effect is good and be reported as follows.

doi: 10.18686/aem.v4i1.2
Received: November 28, 2014; Accepted: January 19, 2015; Published online: February 25, 2015

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2. Materials and methods

2.1. General information

A total of 64 cases of patients with liver resection from January to December 2014 in our hospital were selected where 41 cases of male with age 23–65 years old. The average age is 53 + 3.6 years. The Child-Pugh score is a measure of liver function, especially in people with cirrhosis. The lesion of cirrhosis is located in the liver of the surface of the mouth or the edge which only located in three liver segments. Usually the lesion is less than 10 cm. Among them, 29 patients have hepatic hemangioma and 35 patients have primary liver cancer. 64 patients were divided into open group and laparoscopic group according to the principle of random allocation whereby 32 cases of open group and 32 cases for laparoscopic surgery groups. Two groups of patients are evaluated according to age, gender, tumor diameter, etc., there is no obvious difference in Statistics ($p > 0.05$), with obvious comparability.

The liver can be divided into 8 segments: segment 1 is the caudate lobe, segments 2 through 4 form the anatomic left lobe and segments 5–8 form the anatomic right lobe. For open group patients there have 24 cases of II and III segments, and 8 cases of left lateral lobe at II and IV, segment. Besides, there are also 15 cases of left lateral lobe at II and III segment, 7 cases of left lateral lobe at II and III segment and 10 cases of left lateral lobe at III and IV segment.

2.2. Operation method

Laparotomy operation is performed by using endotracheal general anesthesia, from upper paramedian incision, extending down 2–3 cm to below the umbilicus. It is part of the liver of routine resection. After the resection, the tourniquet is applied first into hepatic portal vein blood in order to stop bleeding. The resection of incision is complete when the layer of incision is closed.

Laparoscopic surgery: Patients with endotracheal were intubated with general anesthesia. Supine position is applied for the patients in whom the head is lower than feet. The area of liver and the surrounding skin were disinfected. Incision is made along the right costal side, in order to ensure the separation of the ligamentum teres from falciform ligament. The transection of the liver is under the condition of non-pneumoperitoneum with electric knife. The pressure of carbon dioxide to the pneumoperitium was established and maintained at about 14 mmHg. Then, the 5 mm incision is inserted into the corresponding position by the laparoscopic operation. The ultrasonic knife was used to separate the adhesion of the liver. The adjacent part of the duodenum was cut in the vicinity of the liver and the stomach to block the liver. The cut was from the introduction of fine hole catheter into the end of pneumoperitoneum. At this point, the hand port and all other laparoscopic devices were removed and ligation of the left hepatic vein was done. Liver vascular clamping was used to clamp of the round ligament of liver which left a hole through the operation of traction. Next, the electric knife was used to remove part of the liver lobe, and put the signs in the boot. Finally, suture the liver section. After removed the drainage tube, control the bleeding and cleaned operation area. When the incision is closed is the marked as the end of the operation [2].

2.3. Observation index

Operation indexes were used as follows; the length of incision, operative bleeding volume, operation time, postoperative recovery index, recovery time, liquid diet time, complications and hospitalization time.

2.4. Statistical processing

Excel is used to establish a database and all statistics are done in the windows SPSS 17.0. Results are reported in numerical and categorical variables with standard difference are expressed as a percentage. The differences between two averages were compared using t test and two sample rate or compositions were compared by Chi-Square test. Results ($\bar{x}$ + s) indicated that the difference was statistically significant when $p < 0.05$.

3. Results

3.1. Two groups of patients with intraoperative and post-operative conditions

Two groups of patients with indications for surgery and postoperative recovery index were compared where laparotomy incision length was significantly longer than the length of the incision in the laparoscopic group ($p < 0.05$). However, the operation time for two groups is not statistically significant difference ($p > 0.05$). For open group the bleeding of blood loss was significantly more than in the laparoscopic group ($p < 0.05$). Besides that, open surgery group has backward liquid time late than that of laparoscopic group postoperative advanced liquid time ($p < 0.05$). In addition, laparotomy group post-operative hospitalization time was significantly longer than that in laparoscopic group after hospitalization time ($p < 0.05$). The detailed results are as shown in Table 1.

3.2. Two groups of patients with post-operative complications in the future

In the open group, 4 cases had post-operative complications in which the incidence rate was 12.50% while for Laparoscopic group the incidence of complications was

Table 1. Comparison of the situation of the two groups of patients with intraoperative and postoperative conditions ($\bar{x}$ + s).

Group	n	Cut length (cm)	Operation time (min)	Intraoperative blood loss (mL)	Postoperative eating time (d)	Hospitalization time (d)
Open group	32	20.14 ± 4.98	192 ± 42.31	400.34 ± 185.45	4.01 ± 0.29	7.01 ± 1.15
Laparoscopic group	32	3.87 ± 0.94	180 ± 81.35	240.00 ± 146.29	1.25 ± 0.51	17.21 ± 6.59
p	-	< 0.05	> 0.05	< 0.05	< 0.05	< 0.05

Table 2. The results of recent complications after surgery in the two groups were compared in detail.

Group	n	Recent complications (case)	Complication incidence (%)	p
Open group	32	4	12.50	> 0.05
Laparoscopic group	32	1	3.13	

3.13%. However, there was no significant difference between these two groups ($p > 0.05$)

4. Discussion

The liver is the largest organ of the human body. However, in the process of partial resection, it is extremely prone to bleeding, difficult to control and thus difficult to remove during liver surgery. In the traditional open surgery, suture ligation, hepatic portal blood flow occlusion and sand bar oppression, etc., are used but the effects are not known in general. With the development of minimally invasive surgery, laparoscopic application is more and more extensive in which the effective reduction of the operation of patients with injury, incision is small, low risk and very conducive to post-operative recovery. However, laparoscopic hepatectomy is difficult to control as well as the factor of the technical requirements are incomparably high in price. The traditional method of hemostasis is no longer suitable for laparoscopic liver resection. This is because, the used of laparoscopic surgery is good in improving the quality of surgery and surgical techniques which able to stop bleeding during the surgery.

4.1. The application of surgical incision and ultrasonic knife

In the laparoscopic surgery, the probe light source were put depth of the patient to ensure the operation has good vision. Only a very small incision can be performed for the protection of the casing, so that only gives a small degree of damage, thereby reducing the patient's pain. This is conducive to the recovery of patients. With open group incision, more water evaporation is happened thus resulting patients are relatively slow in recovery. Ultrasonic knife is used to remove the liver which is effective in order to protect large blood vessels, the surrounding healthy tissues, and leave the remaining parts of liver is not damage. Ultrasonic knife resection will not produce electric current, so it will decrease the liver blood loss thus reducing the amount of bleeding. Therefore, resection in the liver can be performed effectively.

4.2. Operation time

The study showed that the operation time of the two groups of patients is relatively short, but there is no obvious difference between the two groups in operation time. The reason may be that laparoscopic operation is not yet mature, so the operation time is relatively long whereas for open surgery the operation of the technology has been developed due to a long time of practiced. In a meantime, with the development of laparoscopic surgery, the operation time may be shortened gradually.

4.3. Intra-operative blood loss

The incision in the open group was large, so the amount of bleeding was also high. It was necessary to free the liver in the course of resection. However, in the laparoscopic group, the incision was clear, and can be enlarged, which can be clearly distinguishing the vessel with more than 2 mm with an appropriate treatment. In order to control and prevent the occurrences of bleeding, patients with cirrhosis symptoms is need to determine first by using accurate CT examination. Titanium clips is used to clamp the small vein and the large blood vessel. The clamping should be timely turn to open so that it can reduce the amount of bleeding, thus avoid complications [3].

4.4. Post-operative eating time

Open operation group has large internal exposure area so it takes long time to recover. Thus, it is not conducive to post-operative recovery of gastrointestinal function, while the laparoscopic group of small incision has a relatively closed environment for surgery where this technique is able to avoid excessive exposure of internal organs and preventing water evaporation. Besides, it is also conducive for the rapid recovery of gastrointestinal function after surgery.

4.5. Complications

The wound healing for laparotomy group is slow, thus it will increase the possibility of infection. However, for the laparoscopic group, there is only small wound in which lower the wound healing time and infection less likely. Prior to resection of hepatic vein, clipping procedure has many things need to consider in prevention of Intraoperative hemorrhage, carbon dioxide gas embolism and gas embolism. The correct surgical position is important during monitoring and observation of the patient. Vital signs and expiratory of carbon dioxide is observed for optimum pneumoperitoneum pressure. For preventing of bile leakage, the correct treatment of the liver section is needed. The use of fibrin glue to the bile duct is necessary to set up the drainage tube thus can effectively prevent bile leakage. However, because of the gradual increase in the level of modern medical treatment, there is no obvious difference between the two groups in complications and infection [1,3].

4.6. Hospitalization time

An intra-operative blood loss and post-operative eating time from the surgical incision of laparoscopic group shows were significantly better than the open group. Therefore, the recovery time of the laparoscopic group was relatively short, and the length of stay at hospital was also relatively short.

In short, compared with open surgery, laparoscopic surgery has obvious advantages, not only can make patients less pain, fast recovery, shorter hospital stay, but also can reduce the cost of patients. Therefore, it is a relatively good operation method and worth for promoting in clinical use.

Conflicts of interest

These authors have no conflicts of interest to declare.

Authors' contributions

These authors contributed equally to this work.

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